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Women's Perspectives on Smoking and Pregnancy and Graphic Warning Labels

Denise M. Levis, MA, PhD,

Health Communication Specialist, Centers for Disease Control and Prevention, Division of Birth Defects and Developmental Disabilities, Atlanta, GA

Brenda Stone-Wiggins, PhD, MPH,

Research Public Health Analyst, RTI International, Public Health Research Division, Research Triangle Park, NC

Michelle O'Hegarty, PhD,

Health Communication Specialist, Centers for Disease Control and Prevention, Office on Smoking and Health, Atlanta, GA

Van T. Tong, MPH,

Epidemiologist, Centers for Disease Control and Prevention, Division of Reproductive Health, Atlanta, GA

Kara N. D. Polen, MPH,

Associate Service Fellow, Centers for Disease Control and Prevention, Division of Birth Defects and Developmental Disabilities, Atlanta, GA

Cynthia H. Cassell, PhD, and

Health Scientist, Centers for Disease Control and Prevention, Division of Birth Defects and Developmental Disabilities, Atlanta, GA

Mary Council, BA

Health Policy Analyst, RTI International, Public Health Research Division, Research Triangle Park, NC

Abstract

Objectives—To explore women's knowledge, attitudes, and beliefs about adverse outcomes associated with smoking during pregnancy and which outcomes might motivate cessation; to explore reactions to graphic warnings depicting 2 adverse outcomes.

Methods—Twelve focus groups were conducted with women of childbearing age who were current smokers.

Correspondence Dr Levis; igc1@cdc.gov.

Human Subjects Statement

The research protocol was approved by the RTI International Institutional Review Board. Informed consent was obtained from participants prior to data collection.

Conflict of Interest Statement

The authors have no competing interests pertaining to this research.

Results—Participants had low to moderate awareness of many outcomes and believed it was acceptable to smoke in the first trimester before knowledge of pregnancy. Perceived susceptibility to outcomes was low. Motivators included risk-focused information, especially serious risks to the baby (eg, stillbirth, SIDS). Graphic warnings produced strong reactions, especially the warning with a real photo.

Conclusions—Despite barriers to reducing rates of smoking during pregnancy, educational information and photos depicting babies' risks could motivate women to quit.

Keywords

smoking during pregnancy; graphic warnings; focus groups; women of childbearing age; knowledge; attitudes, and beliefs; tobacco control and policy

Smoking during pregnancy causes adverse health outcomes that can affect women and infants during and after pregnancy. It increases the likelihood of pregnancy complications such as placenta previa, placental abruption, miscarriage, preterm birth, and premature membrane rupture.^{1,2} Infants born to women who smoke are at higher risk for low birthweight (LBW), stillbirth, infant death (sudden infant death syndrome, or SIDS)^{1,2} and may be at risk of orofacial clefts (ie, cleft lip with or without cleft palate and cleft palate alone).²⁻⁴ Women of childbearing age who smoke are also at higher risk of conception delay and infertility.^{1,2} Despite these risks, according to US Pregnancy Risk Assessment Monitoring System data from 27 sites in 2010, 23% of US women smoked in the 3 months before pregnancy and almost 11% smoked during the last trimester of pregnancy.⁵

US women are increasingly aware that smoking during pregnancy is risky.⁶ Two studies published more than 10 years ago showed that US women were familiar with the risk of LBW.^{7,8} Since then, as previously mentioned, a preponderance of scientific evidence has shown causal associations between smoking before and during pregnancy and adverse health outcomes. Therefore, additional research is needed on women's knowledge, attitudes, and beliefs about the health outcomes currently known to be associated with smoking before and during pregnancy. Furthermore, to our knowledge, no studies have ever assessed US women's knowledge about specific birth defects associated with smoking during pregnancy or which health outcomes might motivate women to quit. Findings could stimulate new or improve existing cessation programs, educational campaigns, and policies that target women of childbearing age.

One initiative that may have widespread reach and influence among US women who smoke is the placement of graphic warning labels on cigarette packages. Studies have found that graphic warning labels attract the attention of smokers,⁹ increase awareness of health hazards of smoking,¹⁰ increase smokers' thoughts about these health risks,^{10,11} and promote interest in smoking cessation.^{9,12} A detailed timeline of the US Food and Drug Administration's (FDA) graphic warning label regulations and court decisions has been previously published.¹³ The Family Smoking Prevention and Tobacco Control Act of 2009 gave the FDA regulatory authority to establish rules for larger and more prominent warning labels, including graphics, on cigarette packaging and advertising. In June 2011, FDA published a final rule requiring graphic warning on cigarette packages and proposed that 9

new warning labels would be in place at the beginning of September 2012. One of 9 proposed graphic warning labels was a cartoon-style graphic of a baby in an incubator with the text warning: “Smoking during pregnancy can harm your baby.” Court challenges have delayed implementation of graphic warnings. A federal appeals court blocked the proposed warnings, citing a violation of corporate speech rights and requesting additional evidence that FDA’s proposed warnings would discourage smoking.¹⁴ The FDA currently plans to undertake research to support new rule-making consistent with the Tobacco Control Act.

We conducted focus groups with women ages 18–30 who were smokers and planning a pregnancy or who were recently pregnant. We explored women’s knowledge, attitudes, and beliefs about adverse health outcomes associated with smoking and pregnancy and which outcomes might motivate them to quit before and during pregnancy. We also examined women’s reactions to graphic warning labels that depicted 2 adverse outcomes associated with tobacco use: an infant with cleft lip with or without cleft palate and an infant in an incubator.

METHODS

Sites and Study Population

English-speaking women ages 18–30 participated in a total of 12 focus groups. Three groups were held, in June and July 2010, in each of 4 US cities, based on geographic diversity and differences in state smoking prevalence: Chattanooga, TN; Chicago, IL; Durham, NC; and Phoenix, AZ.^{5,15}

We created 2 broad audience segments to gather a range of perspectives on smoking and pregnancy (Table 1). To gather perspectives from non-pregnant women who were actively thinking about pregnancy, we recruited women who said they were planning a pregnancy in the next year. To gather perspectives from women who had personal experiences with smoking and pregnancy, we recruited non-pregnant women who quit smoking during some part of a previous pregnancy or who smoked throughout a previous pregnancy. All women recruited were current smokers (currently smoking some days or every day), and their smoking history was also assessed prior to selection (ie, smoked >100 cigarettes in their lifetime). Recruitment also ascertained women’s pregnancy status; we excluded women who were currently pregnant. However, 2 women who participated in the focus groups mentioned during discussions that they were, in fact, pregnant.

We also created high and low socioeconomic status (SES) groups within segments. High SES groups included participants with some college or a college degree and one or both of the following: (1) primary health insurance (eg, employer-based, military, or self-insured); (2) annual household income >\$41,470, which was 2.75 times the annual minimum wage salary. Low SES participants included women with high school/GED education (regardless of income or insurance) or women with no private insurance and a household income \$41,470 regardless of education. Educational attainment was weighted more than income or insurance type in our segmentation scheme because women with low educational attainment are more likely to smoke.^{16,17}

Professional firms recruited women using existing databases of people who wish to be contacted about participating in research studies. These participants were recruited and screened via telephone. Some segments were more difficult to recruit than others, and in those instances we also distributed study flyers to local public health departments and through other local community partners to bolster recruitment efforts. Flyers directed women to contact the recruitment firm by telephone for screening.

Data Collection

The same female moderator led each focus group, which typically lasted 90 minutes. Focus groups were audio-recorded, and project team members took notes behind a one-way mirror.

The Theory of Reasoned Action posits that knowledge, attitudes, and beliefs influence intentions and behaviors.¹⁸ Therefore, the discussion guide included questions that explored women's knowledge, attitudes, and beliefs about outcomes associated with smoking during pregnancy and which outcomes might motivate them to quit. Fear appeal messages, including the severity of and susceptibility to outcomes associated with smoking, are frequently used in tobacco control communications.¹⁹ Thus, the discussion guide included questions about perceived severity of and perceived susceptibility to outcomes associated with smoking during pregnancy. We gauged reactions and assessed participants' motivation to quit smoking after showing 2 graphic warning labels. The first label depicted a newborn infant in an incubator (real photo) used on tobacco packaging in Australia (hereafter, incubator label; Figure 1). The second label was a medical illustration depicting a baby with cleft lip with or without cleft palate with information about the association between smoking and orofacial clefts during pregnancy (hereafter, cleft lip label; Figure 2). At the time of this research, labels developed by the FDA were not yet publicly available. We also asked women to recommend ways that practitioners could better communicate health risks associated with smoking during pregnancy.

Every effort was made to keep participant information confidential, including in the recordings, transcripts, and notes. Participants gave written informed consent prior to the discussion. Afterwards, participants completed an anonymous questionnaire containing items related to demographics and smoking behaviors. Participants received \$75 compensation for their time and a fact sheet about smoking during pregnancy.

Data Analysis

Professional transcriptionists produced verbatim transcripts of audio recordings. Analysis consisted of a systematic review of focus group transcripts and notes. Two project team members (BSW, MC) independently coded transcripts using the constant-comparative method, in which coders find distinct patterns within the data.²⁰ The coders conducted an initial round of coding by reviewing 2 transcripts and comparing codes. Transcript data were grouped together around patterns (eg, aided awareness of health outcomes, perceived susceptibility). From this initial review, a codebook was developed and all transcripts were coded. QSR NVivo 8.0 software facilitated the descriptive reports for each category. The Kappa score (.68) resulting from coders' review of 2 transcripts showed moderate agreement

between the coders. Coders met regularly to discuss and reconcile coding discrepancies. The entire project team reviewed all data categories and discussed priority categories to report.

RESULTS

Focus Group and Participant Characteristics

We conducted 12 focus groups ranging in size from 4–9 participants, with a total of 79 participants. The majority of participants (60%) identified as white and 15% identified as Hispanic/Latina. More than half had either some college education (47%) or a college degree (16%). Smoking initiation occurred, on average, at 16 years old. More than half (59%) reported another smoker living in their household (Table 2).

We describe the qualitative results below, and where applicable, note differences between segments. No differences were found between focus group sites or low and high SES groups.

Knowledge, Attitudes, and Beliefs about Smoking during Pregnancy and Motivators to Quit

Overall, participants knew that smoking during pregnancy can be harmful. In all groups, participants mentioned LBW and premature birth as adverse outcomes associated with smoking during pregnancy. Few mentioned birth defects, generally or specifically (eg, orofacial clefts), and only one participant mentioned SIDS.

The moderator also provided a list of 7 adverse outcomes to assess participants' aided awareness of outcomes (Table 3). Awareness was moderate (42%–57%) for several of the outcomes: miscarriage/stillbirth, problems with placenta, SIDS, and trouble getting pregnant. Few participants were aware of orofacial clefts being associated with smoking.

Despite knowing that smoking during pregnancy is harmful, only some participants held negative attitudes and beliefs about this behavior. Participants with negative attitudes and beliefs mostly came from segments 1a, 1b, and 2a, and believed that women should put their babies first (eg, “baby’s rights to breathe”) describing women who smoked during pregnancy as selfish. However, other participants in these segments held neutral attitudes, insisting that no one had a right to judge women for their decision to smoke during pregnancy. Women in Segment 2b mostly blamed the habit (eg, “bad habit, not bad people”), also insisting that no one had the right to judge. Across all segments, there was sympathy for women who smoke during pregnancy. They acknowledged possible reasons such as stress about the pregnancy, relationship stressors, and addiction to nicotine.

When asked if there was a time period during pregnancy in which it was acceptable for a woman to smoke, many participants believed that it is acceptable to smoke early in the first trimester before a woman knows that she is pregnant. To these women, knowledge of pregnancy is the significant reason to quit. To illustrate:

I think maybe as soon as you find out you’re pregnant [you should quit]. Like I know sometimes people won’t find out until later on, you know, a month or 2 into the pregnancy, but I think once you’re conscious that you’re pregnant, you should

just stop. Same as like having a drink. Some people go out and have cigarettes and have a drink and not even know they're pregnant but, as soon as you consciously know it and do it, that's when it's wrong. So as soon as you find out, you should quit.

[Segment 1a, Low SES, Chicago]

This belief was bolstered by some participants' additional belief that smoking in the beginning of pregnancy is less risky. For example:

I would say like maybe the first month when you don't really know that you're pregnant yet. I mean, I've known pretty much all of my friends and my sisters who have been pregnant didn't know right away and they had all gotten drunk and smoked cigarettes and then they found out. There was no ill effects on the baby at all.

[Segment 1b, Low SES, Raleigh]

Others believed that smoking near the end would not be as harmful as other periods during pregnancy, supposing that a near-term baby would not be at risk for certain outcomes (eg, LBW, prematurity). For example:

I think if you're going to do it, maybe at the end of the pregnancy is better because the baby's already grown what it's going to grow, you know, so I don't think it would affect them because they say the first 3 months of the baby's growing development are the most important of the pregnancy because that's when the baby's growing, so I would think it's better to do it at the, like at the end of the pregnancy, not at the beginning.

[Segment 2a, High SES, Phoenix]

Few participants said that there was no acceptable time period to smoke during pregnancy.

We also asked women to consider the list of adverse outcomes (Table 3) in terms of which ones would motivate them to quit smoking before or during pregnancy. Across all groups, participants said that the risks to the baby were more salient and attention-getting compared to maternal risks. SIDS and stillbirth were cited as most motivating because they meant the loss of a child. Participants were mixed in their assessment of orofacial clefts as a motivator to quit. For some, the permanent scarring and stigmatization that it can cause were strong motivators. However, other women viewed orofacial clefts as "fixable." Regarding LBW, a few participants said that it would not motivate because women prefer smaller babies. Few participants mentioned infertility as a motivator to quit smoking before pregnancy.

Perceived Risks and Susceptibility

Whereas all participants acknowledged the risks of smoking during pregnancy, they also understood that there were no guarantees of outcome in any pregnancy. Across all groups, participants talked about women they knew who experienced an adverse outcome and never smoked; conversely, they also knew of women who smoked during pregnancy and had healthy pregnancies and babies.

Women who had never been pregnant (Segment 1a) overwhelmingly believed that it was not worth the risk to smoke during pregnancy. Some women in the other segments also believed it was not worth the risk, but this perspective was balanced by others who believed that chances were in their favor for having healthy babies regardless of behavior. This belief of a likely healthy outcome was shared by many who smoked during pregnancy (Segment 2b), despite the fact that many of these participants also talked about adverse outcomes they had experienced during previous pregnancies. Additionally, participants said that if a woman or baby experienced an adverse outcome, it would be difficult to attribute specific causes, like smoking.

When discussing the beliefs about risk and susceptibility, focus groups with women who had previous pregnancies (Segments 1b, 2a, and 2b) almost always spontaneously mentioned risks related to quitting smoking during pregnancy. Participants in these groups said they believed or had heard that it was risky to completely quit smoking during pregnancy because it could harm the baby. Some women who smoked during pregnancy (Segment 2b) said they were told by their healthcare providers to cut back, not quit. For example:

If you're addicted to smoking and you get pregnant and you quit during your pregnancy it's very stressful, stressful for the baby, is what the doctor said. That you should maybe not smoke like a pack a day or anything but you should just continue to at least smoke a little bit so it doesn't stress the baby out.

[Segment 2b, Low SES, Chattanooga]

Reactions to Graphic Warning Labels

Participants were each given two 8.5" × 11" pieces of paper, face down, that displayed the individual graphic warning labels in color (Figures 1 and 2). We asked participants to flip the same label over at the same time so that the project team could capture nonverbal reactions. We repeated this procedure with the other label. Both labels produced avoidance behaviors in participants across all groups. Many women looked away or turned the images face down again; this happened more often with the incubator label.

Overall, participants described the incubator label as "realistic," "memorable," "believable," "informative," and "serious." Participants emphasized the importance of using a real photo (not a cartoon) to illustrate the consequences of smoking; they also responded positively to the label's text describing specific risks to the baby and support service information. Some participants across all segments protested, wondering if the baby was born to a woman who smoked.

Participants' reactions to the cleft lip label varied. It resonated with some participants due to the scarring that orofacial clefts would cause. One participant said:

I wouldn't even want to take that risk of my baby scarred for life because I wanted to smoke a cigarette. So I think this is a good advertisement.

[Segment 2b, Low SES, Phoenix]

Conversely, many others believed that orofacial clefts were not serious because they could be surgically corrected. Participants also questioned the authenticity of the label because it used a medical illustration (eg, “an animation, not real”) and some were skeptical about the association of orofacial clefts and smoking, perceiving their susceptibility to this outcome to be low.

Most participants felt strongly that both labels could motivate pregnant women to quit smoking during pregnancy. Asked if either or both labels could motivate women to quit before becoming pregnant, participants were less certain, stating that they could possibly motivate if the woman was actively planning her pregnancy. Participants said that the use of graphic warning labels could also stimulate a woman’s partner to encourage her to quit smoking during pregnancy.

Some participants found the use of graphic warning labels to be offensive and exploitative, describing them as “a scare tactic” and unfair treatment of smokers who use a legal product.

Participants’ Recommendations for Communicating to Other Women

Participants gave several recommendations for messaging. First, messages should be brief and easy to understand. Second, warning labels using graphic images convey messages more effectively than text alone; real photos of babies are powerful because “seeing is believing.” Third, messages should focus on the health risks associated with smoking and negative health effects for babies. Fourth, messages should include statistics about health risks and information about long-term complications that are associated with smoking during pregnancy. Some participants also recommended testimonials and real stories from mothers who smoked during pregnancy and experienced adverse outcomes.

DISCUSSION

To our knowledge, this is the first study to assess US non-pregnant women’s awareness of specific birth defects, like orofacial clefts, associated with smoking during pregnancy and their reactions to graphic warnings depicting risks associated with smoking during pregnancy. Findings from this study offer insight into US women’s knowledge, attitudes, and beliefs about maternal and infant risks associated with smoking during pregnancy and the risks that might motivate women to quit. It also sheds light on some of the barriers to quitting that women face. This research is important because, despite the risks, women continue to smoke during pregnancy and in the months preceding pregnancy.

We found that participants had low to moderate awareness of many outcomes. Participants knew about the risk of LBW and premature birth, supporting previous research on the topic.^{7,8} Higher levels of awareness of LBW and premature birth could potentially be attributed to the current text-based cigarette warning label used in the US: “Smoking by pregnant women may result in fetal injury, premature birth and low birth weight.”²¹

Given participants’ low awareness of many outcomes associated with smoking during pregnancy, health educators and providers might consider including up-to-date, comprehensive information about risks in their educational materials and interventions

designed to motivate women to quit smoking before and/or during pregnancy. Study participants were motivated by risk-focused information, especially serious risks to the baby (eg, stillbirth, SIDS). Health educators and providers also may want to highlight other serious risks that are either unfamiliar to women (eg, cleft lip) or that are not perceived to be serious (eg, LBW). Participants also recommended inclusion of statistics (eg, prevalence) about health risks, information about long-term complications associated with smoking during pregnancy, and testimonials or real stories from mothers who smoked during pregnancy and experienced adverse outcomes.

According to the Theory of Reasoned Action, increased knowledge of adverse outcomes can influence attitudes and beliefs about behaviors; in turn, increased knowledge about health outcomes can influence attitudes, which can increase women's intention to quit smoking before or during pregnancy. Messages containing statistics, information about long-term outcomes, real-life stories, and up-to-date, comprehensive information about all of the risks of smoking during pregnancy potentially can overcome one of the most prominent barriers to quitting encountered in this study: despite knowing that smoking during pregnancy is risky, perceived susceptibility was low among many women, including those who had previously smoked during a pregnancy. However, another prominent barrier found in this study could prove more difficult to eradicate. Most women, even those who did not smoke during a pregnancy, acknowledged the many life stressors that pregnant women face that could further reinforce a woman's desire to smoke. As such, neutral, non-judgmental attitudes and beliefs about smoking during pregnancy were more prevalent than negative attitudes or beliefs.

Another potential barrier to quitting is the difficulty of motivating women to quit before they become pregnant. We learned that women are not motivated to quit smoking beforehand and believe that it is acceptable to continue smoking *until* they know they are pregnant. The tendency to neglect healthy preconception behaviors has been found with other pregnancy-related behaviors as well: women of childbearing age intend to take folic acid;²¹ cease alcohol consumption;²³ and, generally, practice healthy behaviors/stop unhealthy behaviors *after* finding out about pregnancy.²⁴ Pregnancy is a motivational trigger for women to change or adopt new behaviors. Messages about risks to the baby resonate with pregnant women, but not with non-pregnant women.^{22,24} Unfortunately, by the time a woman finds out about her pregnancy and begins prenatal care, it may be too late to prevent some adverse outcomes.²⁵ Furthermore, women who decide to quit smoking prior to pregnancy have more treatment options; cessation medication is not recommended as first-line treatment for pregnant women and safety and efficacy of nicotine-replacement therapy during pregnancy has not been established.^{26–28} Future research could explore what motivates non-pregnant women of childbearing age to quit smoking. CDC's TIPS campaign, which focuses on dramatic health consequences using personal stories, has increased quitline calls and actual cessation among US women and men.²⁹ Stories focused on smoking and pregnancy could be incorporated and their impact studied.

Findings indicate that there is also a need to educate and train providers on recommended approaches for smoking cessation during pregnancy.³⁰ Many participants who were previously pregnant reported that providers counseled them to cut back rather than quit

smoking during pregnancy. Health care providers might incorporate discussions about the timing of smoking cessation during pregnancy (though, ideally, before pregnancy) and the importance of quitting completely into their counseling with patients. Although a few experts have argued that recommending a reduction in smoking (also known as “harm reduction”) might be more acceptable to some patients than cessation, not enough is known about the potential benefits and/or risks to the pregnant woman and infant in using this approach.³¹

In light of the FDA’s plans to undertake research to support the Tobacco Control Act, findings regarding graphic warning labels are important. What we found is consistent with other research on the potential impact of graphic warning labels on whether smokers and nonsmokers think about the negative health consequences of smoking. In countries where graphic warning labels are included on cigarette packaging, smokers are more likely to report thinking about the negative health consequences of smoking.^{32,33} The influence of graphic warnings could go beyond women to partners or other family members. Study participants thought that others’ exposure to the graphic warnings may provide additional motivation for women to quit smoking because of the support they may receive. Support from a spouse or family member, especially a live-in partner or spouse, may be important in smoking cessation efforts.³⁴

Additionally, research suggests that strong graphic warning labels produce strong reactions in people.³⁵ Participants’ reactions to graphic warnings in our study parallel findings from a recent assessment of the FDA’s proposed cartoon-style health warning labels.³⁶ Adult (>18 years) and youth (16–18 years) survey respondents rated a real picture of a baby in an incubator as a more effective warning label than various cartoon-style images depicting the same or similar adverse pregnancy outcomes. Participants in our study used words like “believable” and “serious” to describe the real photo of a baby in an incubator. Some participants in our study were skeptical about the cleft lip label. Questions about the authenticity of a medical illustration and participants’ lack of awareness of orofacial clefts being associated with smoking and pregnancy are 2 possible reasons for participants’ skepticism. Additional research could explore the use of real photos to depict the risk of cleft lip. International medical charities have used photos of children with cleft lip in their advertising campaigns, demonstrating their belief in the potency of the image to attract supporters.³⁷ Whenever possible, cigarette labels should use real photos of people with smoking-related diseases and include specific factual information regarding the health risks of tobacco use.

This study has a few limitations. Though we attempted to gather diverse perspectives on smoking and pregnancy using segmentation and recruiting women from 4 US cities, the small sample of women in each segment and sampling strategy (ie, convenience) could limit generalizability of findings. Many participants were white and educated (eg, some college or college degrees). Social desirability may have influenced how participants responded to certain questions. We only asked participants to review 2 sample warning labels, including one developed specifically for this study, and so we cannot conclude from this study alone that using real photos may be more effective than cartoons or illustrations to communicate the risks of smoking during pregnancy.

Despite the limitations, results from this study, many of them new findings, can inform policymakers' and practitioners' efforts to increase smoking cessation among women before and during pregnancy.

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References

1. The Health Consequences of Smoking: A Report of the Surgeon General. Atlanta, GA: Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2004. Available at: http://www.cdc.gov/tobacco/data_statistics/sgr/2004/complete_report/index.htm. Accessed April 4, 2014
2. How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-attributable Disease: A Report of the Surgeon General. Washington, DC: Department of Health and Human Services, Public Health Service, Office of Surgeon General; 2010. Available at: http://www.cdc.gov/tobacco/data_statistics/sgr/2010/consumer_booklet/pdfs/consumer.pdf. Accessed April 4, 2014
3. Little J, Cardy A, Munger RG. Tobacco smoking and oral clefts: a meta-analysis. *Bull World Health Org.* 2004; 82(3):213–218. [PubMed: 15112010]
4. Honein MA, Rasmussen SA, Reefhuis J, et al. Maternal smoking and environmental tobacco smoke exposure and the risk of orofacial clefts. *Epidemiology.* 2007; 18(2):226–233. [PubMed: 17202867]
5. Tong VT, Dietz PM, Morrow B, et al. Trends in smoking before, during, and after pregnancy – Pregnancy Risk Assessment Monitoring System, United States, 40 Sites, 2000–2010. *MMWR Morb Mortal Wkly Rep.* 2013; 62(SS06):1–19. [PubMed: 23302815]
6. Kim SY, England LJ, Kendrick JS, et al. The contribution of clinic-based interventions to reduce prenatal smoking prevalence among US women. *Am J Public Health.* 2009; 99(5):893–898. [PubMed: 19299672]
7. Dunn CL, Pirie PL, Lando HA. Attitudes and perceptions related to smoking among pregnant and postpartum women in a low-income, multiethnic setting. *Am J Health Promot.* 1998; 12(4):267–274. [PubMed: 10178621]
8. Arnold CL, Davis TC, Berkel HJ, et al. Smoking status, reading level, and knowledge of tobacco effects among low-income pregnant women. *Prev Med.* 2001; 32(4):313–320. [PubMed: 11304092]
9. Hammond D, Fong GT, McDonald PW, et al. Impact of the graphic Canadian warning labels on adult smoking behaviour. *Tob Control.* 2003; 12:391–395. [PubMed: 14660774]
10. FCTC Article 11. Chapter 1 Tobacco Labeling Toolkit. Evidence Review (on-line). Available at: <http://www.to-baccolabels.ca/tobaccolab/uatldtook>. Accessed May 1, 2012
11. The Health Effects of Tobacco and Health Warnings Messages on Cigarette Packages: Survey of Adults and Adult Smokers. Report prepared for Health Canada (on-line) Available at: <http://www.smoke-free.ca/warnings/WarningsResearch/POR-04-19%20Final%20Report%205552%20Adult%20wave%209.pdf>. Accessed May 1, 2012
12. Hammond D, McDonald PW, Fong GT, Cameron R. Cigarette warning labels, smoking bans, and motivation to quit smoking: evidence from former smokers. *Can J Public Health.* 2004; 95(3):201–204. [PubMed: 15191132]
13. Huang J, Chaloupka FJ, Fong GT. Cigarette graphic warning labels and smoking prevalence in Canada: a critical examination and reformulation of the FDA regulatory impact analysis. *Tob Control.* 10.1136/tobac-cocontrol-2013-051170
14. RJ Reynolds Tobacco Co v FDA. 11-5332 (D.C. Cir. Aug. 24, 2012)
15. PRAMS and smoking (on-line). Available at: <http://www.cdc.gov/prams/TobaccoandPRAMS.htm>. Accessed April 27, 2012

16. Women and Smoking: A Report of the Surgeon General. Washington, DC: Department of Health and Human Services, Public Health Service, Office of Surgeon General; 2001. Available at: http://www.cdc.gov/tobacco/data_statistics/sgr/2001/complete_report/index.htm. Accessed April 4, 2014
17. Graham H. Women and smoking: understanding socioeconomic consequences. *Drug Alcohol Depend.* 2009; 104(Suppl 1):S11–S16. [PubMed: 19345520]
18. Ajzen, I.; Fishbein, M. *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice Hall; 1980.
19. Biener L, Taylor TM. The continuing importance of emotion in tobacco control media campaigns: a response to Hastings and MacFadyen. *Tob Control.* 2002; 11:75–77. [PubMed: 11891373]
20. Krueger, RA.; Casey, MA. *Focus Groups. A Practical Guide for Applied Research*. Thousand Oaks, CA: Sage Publications; 2009.
21. *Reducing the Health Consequences of Smoking: Twenty-five Years of Progress A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1989. DHHS Publication No. (CDC) 89-8411 Available at: <http://profiles.nlm.nih.gov/ps/access/NNBBXS.pdf>. Accessed April 4, 2014
22. Prue CE, Flores AL, Panissidi P, Lira A. But I've already had a healthy baby: folic acid formative research with Latina mothers. *J Womens Health.* 2008; 17:1257–1269.
23. Elek E, Harris SL, Squire CM, et al. Women's knowledge, views and experiences regarding alcohol use and pregnancy: opportunities to improve health messages. *American Journal of Health Education.* 2013; 44(4):177–190.
24. Squiers L, Mitchell EW, Levis DM, et al. Consumers' perceptions of preconception health. *Am J Health Promot.* 2013; 27(Sp3):s10–s19. [PubMed: 23286658]
25. Atrash HK, Johnson K, Adams M, et al. Preconception care for improving perinatal outcomes: the time to act. *Matern Child Health J.* 2006; 10:s3–s11. [PubMed: 16773452]
26. Fiore, MC.; Jaén, CR.; Baker, TB., et al. *Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guideline*. Rockville, MD: US Department of Health and Human Services, Public Health Service; May. 2008 Available at: http://www.aafp.org/dam/AAFP/documents/patient_care/clinical_recommendations/TreatingTobac-coUseandDependence-2008Update.pdf. Accessed April 4, 2014
27. Tobacco use and women's health. *Obstet Gynecol.* 2011; 118:746–750. [PubMed: 21860316] ACOG Committee Opinion No. 503
28. Coleman T, Cooper S, Thornton JG, et al. A randomized trial of nicotine-replacement therapy patches in pregnancy. *N Engl J Med.* 2012; 366(9):808–818. [PubMed: 22375972]
29. McAfee T, Davis KC, Alexander RL, et al. Effect of the first federally funded US antismoking national media campaign. *Lancet.* 2013; 382(9909):2003–2011. [PubMed: 24029166]
30. Tong VT, Dietz PM, England LB. Smoking cessation for pregnancy and beyond: a virtual clinic. An innovative web-based training for health care providers. *J Womens Health.* 2012; 21(10): 1014–1017.
31. Windsor RA, Li CQ, Boyd NR, Hartmann KE. The use of significant reduction rates to evaluate health education methods for pregnant smokers: a new harm reduction behavioral indicator? *Health Educ Behav.* 1999; 26(5):648–662. [PubMed: 10533170]
32. Hammond D, Fong GT, Borland R, et al. Text and graphic warnings on cigarette packages: findings from the international tobacco control four country study. *Am J Prev Med.* 2007; 32:202–209. [PubMed: 17296472]
33. Peters E, Romer D, Slovic P, et al. The impact and acceptability of Canadian-style cigarette warning labels among U.S. smokers and nonsmokers. *Nicotine Tob Res.* 2007; 9:473–481. [PubMed: 17454702]
34. Park E, Tudiver F, Schultz JK, Campbell T. Does enhancing partner support and interaction improve smoking cessation? A meta-analysis. *Ann Fam Med.* 2004; 2(2):170–174. [PubMed: 15083859]
35. Fathelrahman AI, Li L, Borland R. Stronger pack warnings predict quitting more than weaker ones: finding from the ITC Malaysia and Thailand surveys. *Tob Induc Dis.* 2013; 11(20) Available at: <http://www.tobaccoinduceddiseases.com/content/11/1/20>. Accessed March 31, 2014.

36. Hammond D, Reid JL, Driezen P, Boudreau C. Pictorial health warnings on cigarette packs in the United States: an experimental evaluation of the proposed FDA warnings. *Nicotine Tob Res.* 2013; 15(1):93–102. [PubMed: 22505660]
37. Little J, Cardy A, Glimour M, Mossey PA. Smoking and orofacial clefts: a United Kingdom–based case-control study. *Cleft Palate Craniofac J.* 2004; 41(4):381–386. [PubMed: 15222794]

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Figure 1. One of 2 Graphic Warning Labels Shown to Focus Group Participants
Note. This label is used on tobacco packaging in Australia.



Figure 2. Second of 2 Graphic Warning Labels Shown to Focus Group Participants

Note. This label was designed for our focus groups to assess participants' reactions to an image of cleft lip with or without cleft palate.

Table 1

Segmentation Strategies for Recruitment and Conducting Focus Groups

Strategy 1. To understand perspectives of women who were <i>planning</i> to be pregnant in the next year.			
	Pregnancy History	SES Groups^a	Sites
Segment 1a	Never pregnant	1 high, 2 low	Chicago, IL Chattanooga, TN Raleigh, NC
Segment 1b	Pregnant in past 2 years	2 high, 1 low	Chattanooga, TN Phoenix, AZ Raleigh, NC
Strategy 2. To understand perspectives of women who were <i>previously</i> pregnant (<2 years ago) and smoked.			
	Smoking and Pregnancy History	SES Groups	Sites
Segment 2a	Quit smoking anytime during pregnancy	2 high, 1 low	Chicago, IL Phoenix, AZ Raleigh, NC
Segment 2b	Did not quit smoking during pregnancy	2 high, 1 low	Chicago, IL Chattanooga, TN Phoenix, AZ

Note.

^aSES = socioeconomic status (definitions of high and low SES are located in Methods section)

Table 2

Demographic and Smoking Characteristics for Focus Group Participants at 4 US Sites, 2010

	Chattanooga, TN	Chicago, IL	Phoenix, AZ	Raleigh, NC
No. of participants	N = 24	N = 19	N = 15	N = 21
Segments	1a, 1b, 2b	1a, 2a, 2b	1b, 2a, 2b	1a, 1b, 2a
Characteristic				
Age, M (SD)^a	25 (3.1)	26 (2.8)	27 (4.2)	25.7 (3.6)
Ethnicity, Hispanic or Latina	4 ^b	16	53	0
Race				
White	88	42	27	67
African American	8	42	40	29
Other	4	16	33	5
Education				
Less than high school	8	0	0	0
High school/GED	58	0	27	43
Some college	29	79	67	24
College graduate	4	21	7	33
Annual Household Income				
\$41,470 ^c	79	63	47	67
>\$41,470	21	37	53	33
Insurance Coverage/Type				
Public	29	5	60	29
Private	33	53	33	48
Age Started Smoking, M (SD)^a	16.1 (3.3) ^d	15.8 (3.1)	13.9 (3.1)	16.3 (3.2)
Current Cigarette Usage Per Day, Med^e	8	19	10	14
Smoker in Household	61 ^d	53	67	57

Note.

^a Abbreviations: M (SD) = Mean (Standard Deviation); Med = Median^b Values are percentages unless otherwise noted and may not add up to 100% due to rounding.^c Income based on annual minimum wage salary.^d Indicates missing data from one participant.^e Median calculated because several respondents misinterpreted this item.

Table 3

Participants' Aided Awareness of Adverse Outcomes Caused by Smoking Before or During Pregnancy

Adverse Outcome Type	Awareness (%)
Low birth weight	96
Premature birth	95
Miscarriage/stillbirth	57
Problems with placenta	57
Sudden Infant Death Syndrome (SIDS)	53
Trouble getting pregnant	42
Orofacial clefts	9

Note.

Awareness was gauged by polling participants ("yes" or "no"); not all participants responded to each adverse outcome type.